Agency for Healthcare Research and Quality
Advancing Excellence in Health Care

NATIONAL QUALITY MEASURES CLEARINGHOUSE

General

Title

Hospital standardized mortality ratio (HSMR): the ratio of the actual number of acute in-hospital deaths to the expected number of in-hospital deaths, for conditions accounting for about 80% of inpatient mortality.

Source(s)

Canadian Institute for Health Information (CIHI). Technical notes: hospital standardized mortality ratio (HSMR). Ottawa (ON): Canadian Institute for Health Information (CIHI); 2014 Sep. 20 p.

Measure Domain

Primary Measure Domain

Clinical Quality Measures: Outcome

Secondary Measure Domain

Does not apply to this measure

Brief Abstract

Description

This measure is used to assess the ratio of the actual number of in-hospital deaths in a region or hospital to the number that would have been expected based on the types of patients a region or hospital treats, among the 72 diagnosis groups accounting for about 80% of inpatient mortality.

Rationale

The hospital standardized mortality ratio (HSMR) is an important measure to improve patient safety and quality of care in Canadian hospitals.

The HSMR adjusts for factors that affect in-hospital mortality rates, such as patient age, sex, length of stay, admission status, comorbidity group and transfers. It then compares the actual number of deaths in a hospital with the average Canadian experience. The ratio provides a starting point to assess mortality rates and identify areas for improvement to help reduce hospital deaths.

The HSMR was developed in the United Kingdom in the mid-1990s and has been used by several countries. When tracked over time, the ratio can be a motivator for change. The HSMR indicates how successful hospitals and health regions have been in reducing inpatient deaths—leading to improved patient care. The Canadian Institute for Health Information (CIHI) has led the effort in calculating HSMRs for Canada and publishes results for eligible facilities and regions in all provinces.

Evidence for Rationale

Hospital standardized mortality ratio (HSMR). [internet]. Ottawa (ON): Canadian Institute for Health Information (CIHI); [accessed 2015 Jan 30]. [2 p].

Primary Health Components

Hospital standardized mortality ratio (HSMR); in-hospital mortality; observed (actual) to expected deaths

Denominator Description

Expected number of deaths among the 72 diagnosis groups accounting for about 80% of inpatient mortality (see the related "Denominator Inclusions/Exclusions" field)

Numerator Description

Actual number of deaths among the 72 diagnosis groups accounting for about 80% of inpatient mortality multiplied by 100 (see the related "Numerator Inclusions/Exclusions" field)

Evidence Supporting the Measure

Type of Evidence Supporting the Criterion of Quality for the Measure

A formal consensus procedure, involving experts in relevant clinical, methodological, public health and organizational sciences

Additional Information Supporting Need for the Measure

- In 2009 to 2010, 72 diagnosis groups accounted for about 80% of deaths among patients who did not receive palliative care. The top causes of deaths in Canadian hospitals were: stroke, heart failure, chronic obstructive pulmonary disease (COPD), pneumonia, sepsis and heart attack (acute myocardial infarction). Trends in mortality rates vary by patient group. For example, death rates for patients with heart attacks fell faster than those for patients with pneumonia over the study period. In contrast, mortality rates stayed constant or rose for other patient groups, such as those with chronic obstructive pulmonary disease and sepsis.
- In Canada, standardized in-hospital death rates have fallen over the last three years. However, results vary by patient group. For example, death rates for patients with heart attacks fell faster than those for patients with pneumonia. Trends also vary across the country. Refer to *HSMR: A New Approach for Measuring Hospital Mortality Trends in Canada* in the "Companion Documents" field for hospital standardized mortality ratio (HSMR) trends by health region and hospital.

Evidence for Additional Information Supporting Need for the Measure

Canadian Institute for Health Information (CIHI). HSMR: a new approach for measuring hospital mortality trends in Canada. Ottawa (ON): Canadian Institute for Health Information (CIHI); 2007. 100 p. [74 references]

Extent of Measure Testing

Unspecified

State of Use of the Measure

State of Use

Current routine use

Current Use

not defined yet

Application of the Measure in its Current Use

Measurement Setting

Hospital Inpatient

Professionals Involved in Delivery of Health Services

not defined yet

Least Aggregated Level of Services Delivery Addressed

Single Health Care Delivery or Public Health Organizations

Statement of Acceptable Minimum Sample Size

Unspecified

Target Population Age

Age 29 days to 120 years

Target Population Gender

Either male or female

National Strategy for Quality Improvement in Health

Care

National Quality Strategy Aim

Better Care

National Quality Strategy Priority

Making Care Safer
Prevention and Treatment of Leading Causes of Mortality

Institute of Medicine (IOM) National Health Care Quality Report Categories

IOM Care Need

Getting Better

IOM Domain

Effectiveness

Safety

Data Collection for the Measure

Case Finding Period

April 1 of a given year through March 31 of the following year

Denominator Sampling Frame

Clinical information

Denominator (Index) Event or Characteristic

Clinical Condition

Institutionalization

Patient/Individual (Consumer) Characteristic

Denominator Time Window

not defined yet

Denominator Inclusions/Exclusions

Inclusions
Expected* number of deaths among the 72 diagnosis groups accounting for about 80% of inpatient mortality

- Discharge between April 1 of a given year and March 31 of the following year
- Admission to an acute care institution
- Discharge with diagnosis group of interest (that is, one of the diagnosis groups that account for about 80% of in-hospital deaths, after excluding patients with palliative care)
- Age at admission between 29 days and 120 years
- Sex recorded as male or female
- Length of stay of up to 365 consecutive days
- Admission category is elective (L) or emergent/urgent (U)
- Canadian resident (see Appendix II in the original measure documentation for information on identifying non-residents)

*The expected number of deaths for a hospital is based on the sum of the probabilities of in-hospital death for cases from that hospital. See also the "Description of Allowance for Patient or Population Factors" field.

Exclusions

- Cadavers, with discharge disposition = 08
- Stillborns, with discharge disposition = 09
- Sign-outs (that is, discharged against medical advice), with discharge disposition = 06
- Patients who do not return from a pass, with discharge disposition = 12
- Neonates, with age at admission less than or equal to 28 days
- Records with brain death as most responsible diagnosis code (International Statistical Classification of Diseases and Related Health Problems, 10th Revision, Canadian Enhancement [ICD-10-CA]): G93.81
- Records with palliative care

Note: Refer to the original measure documentation for diagnosis groups and categories, administrative codes, calculation of expected deaths, and additional information.

Exclusions/Exceptions

not defined yet

Numerator Inclusions/Exclusions

Inclusions
Actual number of deaths among the 72 diagnosis groups accounting for about 80% of inpatient mortality multiplied by 100

Exclusions
Unspecified

Numerator Search Strategy

Institutionalization

Data Source

Administrative clinical data

Type of Health State

Death

Instruments Used and/or Associated with the Measure

Unspecified

Computation of the Measure

Measure Specifies Disaggregation

Does not apply to this measure

Scoring

Ratio

Interpretation of Score

Desired value is a lower score

Allowance for Patient or Population Factors

not defined yet

Description of Allowance for Patient or Population Factors

Coefficients derived from logistic regression models are used to calculate the probability of in-hospital death. For each of the 72 diagnosis groups, a logistic regression model is fitted with the following independent variables: age, sex, length-of-stay group, admission category, comorbidity group and transfers. All of the models are based on data from all acute hospitals in Canada. See Appendix I in the original measure documentation for more details on how the expected number of deaths is determined.

Standard of Comparison

not defined yet

Identifying Information

Original Title

Hospital standardized mortality ratio (HSMR).

Submitter

Canadian Institute for Health Information - Nonprofit Organization

Developer

Canadian Institute for Health Information - Nonprofit Organization

Funding Source(s)

Canadian Government

Composition of the Group that Developed the Measure

Unspecified

Financial Disclosures/Other Potential Conflicts of Interest

Unspecified

Adaptation

The measure was initially developed in the United Kingdom in mid-1990s by Sir Brian Jarman of Imperial College. It has been adapted from the following source by the Canadian Institute for Health Information (CIHI) to be used in Canadian context:

Hospital standardized morality ratio (HSMR) (Sir Brian Jarman, Imperial College, United Kingdom)

Date of Most Current Version in NQMC

2014 Sep

Measure Maintenance

Unspecified

Date of Next Anticipated Revision

2015 Dec

Measure Status

This is the current release of the measure.

This measure updates a previous version: Canadian Institute for Health Information (CIHI). Technical notes: hospital standardized mortality ratio (HSMR). Ottawa (ON): Canadian Institute for Health Information (CIHI); 2013 Sep. 21 p.

The measure developer reaffirmed the currency of this measure in April 2016.

Measure Availability

Source available from the Canadian Institute for Health Information (CIHI) Web site .

For more information, contact CIHI at 4010 Yonge Street, Suite 300, Toronto, Ontario, Canada, M2P 2B7; Phone: 416-481-2002; Fax: 416-481-2950; E-mail: hsmr@cihi.ca; Web site: www.cihi.ca .

Companion Documents

The following is available:

> Canadian Institute for Health Information (CIHI). HSMR: a new approach for measuring hospital mortality trends in Canada. Ottawa (ON): Canadian Institute for Health Information (CIHI); 2007. 100 p. This document is available from the Canadian Institute for Health Information (CIHI) Web site .

NQMC Status

This NQMC summary was completed by ECRI Institute on April 12, 2011. The information was verified by the measure developer on May 4, 2011.

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The information was reaffirmed by the measure developer on April 29, 2016.

Copyright Statement

Production

Source(s)

Canadian Institute for Health Information (CIHI). Technical notes: hospital standardized mortality ratio (HSMR). Ottawa (ON): Canadian Institute for Health Information (CIHI); 2014 Sep. 20 p.

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